Public Schools of North Carolina
State Board of Education | Department of Public Instruction

Algebra II Curriculum Crosswalk

The following document is to be used to compare the 2003 North Carolina Mathematics Standard Course of Study for Algebra II and the Common Core State Standards for Mathematics for Algebra II.

As noted in the Common Core State Standards for Mathematics document, the high school standards specify the mathematics that all students should study in order to be college and career ready. Mathematics concepts that lay the foundation for more advanced courses are indicated by a plus (+). Specific modeling standards appear throughout the high school Common Core State Standards for Mathematics and are indicated by a star (⋆). The high school standards were developed in conceptual categories that portray a coherent view of high school mathematics that cross a number of course boundaries. These conceptual categories include:

- Number and Quantity
- Algebra
- Functions
- Modeling
- Geometry
- Statistics and Probability

To download the Common Core State Standards, please visit http://www.corestandards.org/the-standards.

Important Note: The current SCoS will continue to be the taught and tested standards in the 2010-11 and 2011-12 school years. We expect the new Common Core standards to be taught and assessed in schools for the first time in the 2012-13 school year. That said, we are providing resources now and over the next two-years so that schools and teachers can get a head start on internalizing and planning to teach the new standards.

NC SCOS			Common Core			
Strand	Objective	Text of objective	Domain	Standard	**Cluster** Text of objective	Comments
Number and Operations	1.01	Simplify and perform operations with rational exponents and logarithms (common and natural) to solve problems.	Linear, Quadratic, and Exponential Models★	F.LE.4	**Construct and compare linear and exponential models and solve problems** For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.	
	1.02	Define and compute with complex numbers.	The Complex Number System	N.CN.1	**Perform arithmetic operations with complex numbers** Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real.	
				N.CN.2	**Perform arithmetic operations with complex numbers** Use the relation $i^2 = -1$and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.	
	1.03	Operate with algebraic expressions (polynomial, rational, complex fractions) to solve problems.	Seeing Structure in Expression	A.SSE.2	**Interpret the structure of expressions** Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.*	Polynomial and rational expressions are the expectations at this level.
			Arithmetic with Polynomials and Rational Expressions	A.APR.1	**Understand the relationship between zeros and factors of polynomials** Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.	Closure is not in the 2003 NC SCOS. Moving beyond quadratic is the expectation at this level.

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			Arithmetic with Polynomials and Rational Expressions	A.APR.2	**Understand the relationship between zeros and factors of polynomials** Know and apply the Remainder Theorem: For a polynomial *p(x)* and a number a, the remainder on division by *x - a* is *p(a)*, so *p(a) = 0* if and only if *(x - a)* is a factor of *p(x)*.	
				A.APR.5	**Use polynomial identities to solve problems** (+) Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined for example by Pascal's Triangle.	
				A.APR.6	**Rewrite rational expressions** Rewrite simple rational expressions in different forms; write *a(x)/b(x)* in the form *q(x) + r(x)/b(x),* where *a(x), b(x), q(x),* and *r(x)* are polynomials with the degree of *r(x)* less than the degree of *b(x),* using inspection, long division, or, for the more complicated examples, a computer algebra system.	Use of a Computer Algebra System is new to CCSS.
				A.APR.7	**Rewrite rational expressions** (+) Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.	The ideas of closure and the one-to-one correspondence between the value of the rational expressions and rational numbers were not explicit in the 2003 NC SCOS.
	1.04	Operate with matrices to model and solve problems.				Matrices are in the fourth course of the CCSS.

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Strand	Objective	Text of objective	Domain	Standard	**Cluster** Text of objective	Comments
	1.05	Model and solve problems using direct, inverse, combined and joint variation.				Direct variation is in the middle school CCSS. Inverse, combined and joint variations are not in the CCSS.
			The Complex Number System	N.CN.8	**Use complex numbers in polynomial identities and equations** (+) Extend polynomial identities to the complex numbers. *For example, rewrite $x^2 + 4$ as $(x + 2i)(x – 2i)$.*	New to CCSS.
				N.CN.9	**Use complex numbers in polynomial identities and equations** (+) Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.	New to CCSS.
			Seeing Structure in Expression	A.SSE.1	**Interpret the structure of expressions** Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors, and coefficients.	New to CCSS. Polynomial and rational expressions are the expectations at this level.
					Interpret the structure of expressions Interpret expressions that represent a quantity in terms of its context. b. Interpret complicated expressions by viewing one or more of their parts as a single entity.	New to CCSS. Polynomial and rational expressions are the expectations at this level.
			Arithmetic with Polynomials and Rational Expressions	A.APR.4	**Use polynomial identities to solve problems** Prove polynomial identities and use them to describe numerical relationships. *For example, the polynomial identity $(x^2 + y^2)^2 = (x^2 – y^2)^2 + (2xy)^2$ can be used to generate Pythagorean triples.*	New to CCSS.

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			Creating Equations★	A.CED.4	**Create equations that describe numbers or relationships** Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R.*	Literal equations are not explicit in the 2003 NC SCOS. Equations using all available types of expressions, including simple root functions are the expectations at this level.
			Interpreting Functions	F.IF.4	**Interpret functions that arise in applications in terms of the context** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*★	New to CCSS. Selection of appropriate models is the expectation at this level.
				F.IF.5	**Interpret functions that arise in applications in terms of the context** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*★	New to CCSS. Selection of appropriate models is the expectation at this level.
				F.IF.6	**Interpret functions that arise in applications in terms of the context** Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.★	New to CCSS. Selection of appropriate models is the expectation at this level.

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Strand	Objective	Text of objective	Domain	Standard	**Cluster** Text of objective	Comments
				F.IF.9	**Analyze functions using different representations** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*	Comparing two functions is new in CCSS. Using key features to guide selection of appropriate models/functions is the expectation at this level.
			Building Functions	F.BF.1	**Build a function that models a relationship between two quantities** Write a function that describes a relationship between two quantities.⋆ b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.*	New to CCSS. Using operations to combine functions is not explicit in the 2003 NC SCOS. All types of functions studied are the expectation at this level.
Geometry and Measurement	2.01	Use the composition and inverse of function to model and solve problems; justify results.	Building Functions	F.BF.4	**Build new functions from existing functions** Find inverse functions. a. Solve an equation of the form $f(x) = c$ for a simple function f that has an inverse and write an expression for the inverse.	Using composition of functions to verify functions is not in the CCSS. Emphasizing the common effect of each transformation on simple radical, rational and exponential functions is the expectation at this level.
	2.02	Use quadratic functions and inequalities to model and solve problems: justify results. a) Solve using tables, graphs and algebraic properties. b) Interpret the constants and	The Complex Number System	N.CN.7	**Use complex numbers in polynomial identities and equations** Solve quadratic equations with real coefficients that have complex solutions.	The CCSS does not emphasize the use of multiple representations in this standard.

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		coefficients in the context of the problem.	Arithmetic with Polynomials and Ration Expressions	A.APR.2	**Understand the relationship between zeros and factors of polynomials** Know and apply the Remainder Theorem: For a polynomial *p(x)* and a number a, the remainder on division by *x - a* is *p(a)*, so *p(a) = 0* if and only if *(x - a)* is a factor of *p(x)*.	
				A.APR.3	**Understand the relationship between zeros and factors of polynomials** Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.	
			Creating Equations★	A.CED .1	**Create equations that describe numbers or relationships** Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*	Equations using all available types of expressions, including simple root functions are the expectations at this level.
				A.CED.2	**Create equations that describe numbers or relationships** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	Equations using all available types of expressions, including simple root functions are the expectations at this level.

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Strand	Objective	Text of objective	Domain	Standard	**Cluster** Text of objective	Comments
			Interpreting Functions	F.IF.7	**Analyze functions using different representations** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.	
			Interpreting Functions	F.IF.8	**Analyze functions using different representations** Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.	Using key features to guide selection of appropriate models/functions is the expectation at this level.
	2.03	Use exponential functions to model and solve problems; justify results. a) Solve using tables, graphs, and algebraic properties. b) Interpret the constants, coefficients, and bases in the context of the problem.	Creating Equations★	A.CED.1	**Create equations that describe numbers or relationships** Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*	Equations using all available types of expressions, including simple root functions are the expectations at this level.
			Creating Equations★	A.CED.2	**Create equations that describe numbers or relationships** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	Equations using all available types of expressions, including simple root functions are the expectations at this level.

NC SCOS			Common Core			
Strand	Objective	Text of objective	Domain	Standard	**Cluster** Text of objective	Comments
			Interpreting Functions	F.IF.7	**Analyze functions using different representations** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.	Working with trigonometric functions is new in the CCSS. Using key features to guide selection of appropriate models/functions is the expectation at this level.
				F.IF.8	**Analyze functions using different representations** Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. b. Use the properties of exponents to interpret expressions for exponential functions. *For example, identify percent rate of change in functions such as* $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, *and classify them as representing exponential growth or decay.*	Using key features to guide selection of appropriate models/functions is the expectation at this level.
			Linear, Quadratic, and Exponential Models★	F.LE.4	**Construct and compare linear and exponential models and solve problems** For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.	

NC SCOS			Common Core			
Strand	Objective	Text of objective	Domain	Standard	**Cluster** Text of objective	Comments
	2.04	Create and use best-fit mathematical models of linear, exponential, and quadratic functions to solve problems involving sets of data. a) Interpret the constants, coefficients, and bases in the context of the data b) Check the model for goodness-of-fit and use the model, where appropriate, to draw conclusions or make predictions.				Moved to Algebra I CCSS.
	2.05	Use rational equations to model and solve problems; justify results. a) Solve using tables, graphs, and algebraic properties. b) Interpret the constants and coefficients in the context of the problem. c) Identify the asymptotes and intercepts graphically and algebraically.	Creating Equations★	A.CED.1	**Create equations that describe numbers or relationships** Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*	Equations using all available types of expressions, including simple root functions are the expectations at this level.
			Creating Equations★	A.CED.2	**Create equations that describe numbers or relationships** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	Equations using all available types of expressions, including simple root functions are the expectations at this level.
			Reasoning with Equations and Inequalities	A.REI.2	**Understand solving equations as a process of reasoning and explain the reasoning** Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	

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	2.06	Use cubic equations to model and solve problems. a) Solve using tables and graphs. b) Interpret constants and coefficients in the context of the problem.	Arithmetic with Polynomials and Rational Expressions	A.APR.3	**Understand the relationship between zeros and factors of polynomials** Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.	
			Creating Equations★	A.CED.2	**Create equations that describe numbers or relationships** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	Equations using all available types of expressions, including simple root functions are the expectations at this level.
			Interpreting Functions	F.IF.7	**Analyze functions using different representations** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★ c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.	
	2.07	Use equations with radical expressions to model and solve problems; justify results. a) Solve using tables, graphs, and algebraic properties. b) Interpret the degree, constants, and coefficients in the context of the problem.	Creating Equations★	A.CED.2	**Create equations that describe numbers or relationships** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	Equations using all available types of expressions, including simple root functions are the expectations at this level.
			Reasoning with Equations and Inequalities	A.REI.2	**Understand solving equations as a process of reasoning and explain the reasoning** Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	

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			Interpreting Functions	F.IF.7	**Analyze functions using different representations** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★ b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.	Using key features to guide selection of appropriate models/functions is the expectation at this level.
	2.08	Use equations and inequalities with absolute value to model and solve problems; justify results. a) Solve using tables, graphs, and algebraic properties. b) Interpret the degree, constants, and coefficients in the context of the problem.	Creating Equations★	A.CED.2	**Create equations that describe numbers or relationships** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	Equations using all available types of expressions, including simple root functions are the expectations at this level.
			Interpreting Functions	F.IF.7	**Analyze functions using different representations** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★ b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.	Using key features to guide selection of appropriate models/functions is the expectation at this level.
	2.09	Use the equations of parabolas and circles to model and solve problems; justify results. a) Solve using tables, graphs, and algebraic properties. b) Interpret the degree, constants, and coefficients in the context of the problem.				Moved to Geometry CCSS.

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Strand	Objective	Text of objective	Domain	Standard	**Cluster** Text of objective	Comments
	2.10	Use systems of two or more equations or inequalities to model and solve problems; justify results. Solve using tables, graphs, matrix operations, and algebraic properties.	Creating Equations★	A.CED.2	**Create equations that describe numbers or relationships.** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	Equations using all available types of expressions, including simple root functions are the expectations at this level.
				A.CED.3	**Create equations that describe numbers or relationships.** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*	Equations using all available types of expressions, including simple root functions are the expectations at this level.
Algebra			Seeing Structure in Expressions	A.SSE.4	**Write expressions in equivalent forms to solve problems** Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. *For example, calculate mortgage payments.*★	Moved from 2003 fourth math NC SCOS.
			Reasoning with Equations and Inequalities	A.REI.11	**Represent and solve equations and inequalities graphically.** Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and /or $g(x)$ are linear polynomial, rational, absolute value, exponential, and logarithmic functions.	New to CCSS. Polynomial, rational, radical, absolute value and exponential functions are the expectations at this level.

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			Building Functions	F.BF.3	**Build new functions from existing functions** Identify the effect on the graph of replacing *f(x)* by *f(x) + k, k f(x), f(kx)*, and *f(x + k)* for specific values of *k* (both positive and negative); find the value of *k* given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.	Not explicit in the 2003 NC SCOS. Emphasizing the common effect of each transformation on simple radical, rational and exponential functions is the expectation at this level.
			Trigonometric Functions	F.TF.1	**Extend the domain of trigonometric functions using the unit circle** Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.	Moved from 2003 fourth math NC SCOS.
				F.TF.2	**Extend the domain of trigonometric functions using the unit circle** Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.	Moved from 2003 fourth math NC SCOS.
				F.TF.5	**Model periodic phenomena with trigonometric functions** Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.★	Moved from 2003 fourth math NC SCOS.
				F.TF.8	**Prove and apply trigonometric identities** Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle.	Moved from 2003 fourth math NC SCOS.

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Data Analysis and Probability			Interpreting Categorical and Quantitative Data	S.ID.4	**Summarize, represent, and interpret data on a single count or measurement variable** Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.	New to CCSS.
			Making Inferences and Justifying Conclusions	S.IC.1	**Understand and evaluate random processes underlying statistical experiments** Understand statistics as a process for making inferences about population parameters based on a random sample from that population.	New to CCSS.
				S.IC.2	**Understand and evaluate random processes underlying statistical experiments** Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. *For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?*	New to CCSS.
				S.IC.3	**Make inferences and justify conclusions from sample surveys, experiments, and observational studies** Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.	New to CCSS.
				S.IC.4	**Make inferences and justify conclusions from sample surveys, experiments, and observational studies** Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.	New to CCSS.

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				S.IC.5	**Make inferences and justify conclusions from sample surveys, experiments, and observational studies** Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.	New to CCSS.
				S.IC.6	**Make inferences and justify conclusions from sample surveys, experiments, and observational studies** Evaluate reports based on data.	New to CCSS.
			Using Probability to Make Decisions	S.MD.6	**Use probability to evaluate outcomes of decisions** (+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).	New to CCSS. Continuing to build on the foundations from middle school and Geometry by including more complex situations is the expectation at this level.
				S.MD.7	**Use probability to evaluate outcomes of decisions** (+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).	New to CCSS. Continuing to build on the foundations from middle school and Geometry by including more complex situations is the expectation at this level.